LARGE-SCALE, TOUCH-SENSITIVE VIDEO DISPLAY

RELATED APPLICATION DATA

This application is a divisional of prior application Ser. No. 08/011,453; filed Jan. 29, 1993, now U.S. Pat. No. 6,118,433.

FIELD OF THE INVENTION

The present invention relates in general to video display systems, and more particularly to the construction of a large video display unit capable of supporting user interaction.

BACKGROUND OF THE INVENTION

Video walls are being used ever more frequently for displaying visual data on a large physical space. It is known in the art to mount a plurality of television monitors on a vertical surface in a rectangular grid and to control the video signal shown on each monitor for presenting different visual messages. The resulting display is more than just the sum of the outputs of each unit as the units can be combined logically into one large display, or subdivided at will. The use of standard replicated components allows for an inexpensive, flexible video display according to this known prior art.

The current technology is limited by (i) the large depth required by the video wall as each individual monitor requires a video tube in order to display the signal, (ii) the need for a centralized control of the display, and (iii) the lack of a natural input mechanism in order to interact with the display. These limitations restrict the use of video walls to one-way communication devices that simply show the information visually and do not provide for user interaction.

SUMMARY OF THE INVENTION

The present invention addresses these prior art restrictions while losing none of the advantages of well known video wall technology. In addition, according to an aspect of the present invention there is provided a large-scale video display in which (i) the depth of the video display is reduced to less than an inch, (ii) the control of the display is inherently distributed allowing for much more sophisticated control of the images presented, and (iii) direct, complex user interaction is possible with the information on the display. The resulting device can be mounted on any surface, in any orientation in space, including desktops.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is a schematic representation of a basic display unit (BDU);

FIG. **2** shows a collection of BDU's networked together to form a display unit (DU);

FIG. **3** shows the superposition of a touch-sensitive input panel on the basic display unit;

FIG. **4** is a plan view of the touch-sensitive display with human finger as user interface;

FIG. **5** is a plan view of the touch-sensitive display in use for implementing an executive desktop;

FIG. **6** shows the display in use with multiple user interfaces;

FIG. **7** is a schematic representation of a DU coordinate system according to an aspect of the present invention; and

FIG. **8** is a control flow chart showing the flow of messages to a DU driver and messages from the DU driver to a plurality of BDU's.

FIG. **9** is a detailed schematic of the BDUs shown in FIG. **2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows the basic construction of a BDU **1**, a plurality of BDU's being connected to form a display unit (DU) as discussed in greater detail below. Each BDU **1** functions as a separate computer, capable of executing complex programs and controlling its own display **2**. The BDU **1** consists of a flat screen display panel **2**, such as a liquid crystal display or laser plasma display (as currently used in portable computers) connected to a BDU processor **3** (eg. standard portable computer incorporating a CPU for executing a graphics processor application, memory, logic level video driver, etc.). The screen **2** is connected to the BDU processor **3** via a cable (eg. standard ribbon cable) which provides control (video) signals as well as power. The connecting cable may be of any reasonable length and thus the BDU processor **3** need not necessarily be resident in a location adjacent to the display **2**. Disassembling a standard portable computer yields this component. The component can also be purchased directly from the manufacturer as a replacement part. The display can be either monochrome, greyscale or colour. The flat screen display panel is very thin (roughly ⅛") mounted in a hard plastic shell.

The logic level drivers for each BDU **1** are utilized to convert logical operations at the circuit board level into graphical operations (e.g. putpixel, etc.). Logic level driver circuits are available directly from various manufacturers and can be incorporated in the BDU **1** in at least two possible ways. Firstly, the logic level driver may be mounted directly on the CPU board associated with the display **2**. This provides a very fast interface between the processor **3** and the display **2**. However, this approach does not offer a great deal of flexibility, particularly where the display **2** is dedicated to a particular CPU hardware. A second approach is to use a driver that receives standard video (i.e. R,G,B,) and maps the video signals onto the display **2**. This approach results in greater flexibility than the first approach since the display can be mapped to different processor hardware. However, this second approach requires a more expensive interface unit for each display **2**.

Various additional components may be connected directly to the screen **2** depending upon its underlying display technology. Side lit panels, for example, may be included having a light source mounted to the side of the screen.

Each display **2** is pixel based, such that each picture element of the display can be set either on or off (for monochrome displays) or to one of a fixed number of different shades (greyscale displays) or colours (colour displays).

Each BDU **1** is provided with its own power supply (not shown) and is equipped with a standard network connection. Each BDU processor **3** incorporates a predetermined amount of resident memory that is determined by the complexity of the display **2** that it controls and the application program it is to execute, plus a hard disk drive. Floppy disk drives are not necessary but can be included, since software may be loaded in over the network.

Each BDU processor may have an associated keyboard **5** and mouse **7** connected thereto for providing individual